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Fin Configuration and the Coefficient of Drag

Before ever reaching space, a rocket must first travel through the atmosphere where it will encounter the force of drag. The purpose of this experiment was to investigate if changing the fin configuration (size, shape, number, cross section, and location of the fins) on a rocket affects the rocket's drag, as measured by the coefficient of drag. I hypothesized that if the fin configuration changed, then the coefficient of drag would change as well.

The experiment involved building a base model rocket, then modifying the fin configuration on five prototypes by making the fins longer, thinner, square-shaped, moved further up the body, or more numerous. The rockets were all launched with a recording device that measured several variables of flight dynamics needed to calculate the coefficient of drag. The information was recorded, the coefficients of drag calculated, the data was graphed, and the results compared.

The data collected was validated and supported my hypothesis. Results showed varying coefficients of drag for each fin configuration modification. Results also identified a failure in rocket stability in Modification 3, which was explained by the center of pressure being too close to the center of gravity.

These findings lead me to conclude that the coefficient of drag changes in a predictable manner as the fin configuration changes. A possible real-world application of these findings would be a more efficient rocket design for future space exploration.